CASTELLATED WOOD BEAM AND METHOD OF ITS MANUFACTURE

FIELD OF THE INVENTION

This invention relates generally to engineered wood beams and, more specifically to castellated wood beams and method of their manufacture.

BACKGROUND OF THE INVENTION

Castellated beams are well known in the art, and are commonly used when there is a desire to increase a beam's resistance to bending without adding significantly to the overall weight of the beam. Additionally, castellated beams are desirable because the predefined open spaces within the beam provide access for construction materials such as plumbing and electrical wiring without effecting the structural integrity of the beam. Typically, castellated beams are used as floor joists, wall studs, and rafters or with truss configurations. Historically, castellated beams have only been formed from metals or metal alloys such as steel or aluminum. This limited material choice significantly raises the overall cost of the beams, which dramatically affects the overall construction costs of a building. As a result, the use of castellated beams has been limited to larger, commercial type buildings, leaving the residential and smaller commercial building markets without a suitable castellated beam substitute.

SUMMARY OF THE INVENTION

The present invention provides a castellated beam that includes a first beam section that has a cut line pattern defining a plurality of first beam section lands and first beam section grooves. The castellated beam also includes a second beam section, that also has a cut line pattern defining a plurality of second beam section lands and second beam section grooves. As formed, the first beam section lands are connected with the second beam section lands. This castellated beam is constructed from a material that contains wood.

The present invention further includes a method of forming a wood containing beam. The method includes providing a wood containing blank, said wood containing blank having a longitudinal axis. The method also includes cutting the wood containing blank along a cut line pattern to divide the wood containing blank into a first beam section and a second beam section. As formed, the cut line pattern defines a plurality of first beam section lands, first beam section grooves, second beam section lands and second beam section grooves. The method still further includes aligning the first beam section land with the second beam section lands and then fastening the first beam section lands with the second beam section lands.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred and alternative embodiments of the present invention are described in detail below with reference to the following drawings.

FIGURE 1 is a frontal view of a wood containing blank with a cut line pattern according the present invention;

FIGURE 2 is an end view of the of the wood containing blank of FIGURE 1;

FIGURE 3 is a frontal view of a castellated beam according to an aspect of the present invention;

FIGURE 4 an end view of the of the wood containing blank of FIGURE 3;

FIGURE 5 is a frontal view of a castellated beam according to an aspect of the present invention;

FIGURE 6 an end view of the of the wood containing blank of FIGURE 5;

FIGURE 7 is a frontal view of a castellated beam according to an aspect of the present invention;

FIGURE 8 an end view of the of the wood containing blank of FIGURE 7;

FIGURE 9 is a frontal view of a blank according to an aspect of the present invention;

FIGURE 10 is a frontal view of a tapered castellated beam constructed from the blank illustrated in FIGURE 9;

FIGURE 11 is a frontal view of a tapered castellated beam constructed from a portion of the blank illustrated in FIGURE 9;

FIGURE 12 is a frontal view of a wood containing blank with a cut line pattern according an aspect of the present invention;

FIGURE 13 is a frontal view of a castellated beam constructed from the blank illustrated in FIGURE 12; and,

FIGURE 14 is a frontal view of a castellated beam according to an aspect of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed to a castellated wood containing beam and method of making same. By way of overview and with reference to FIGURES 1-14, one suitable embodiment includes a blank 20 of wood containing material cut and reformed into a castellated beam 21. Specific details of the castellated beam 21 and method of its formation is described in more detail below.

The blank 20 is a wood containing material. In an embodiment, the blank 21 is a laminated strand lumber product such as Timberstrand® manufactured by the Weyerhaeuser Company. However, other suitable, non-limiting material examples the blank 20 may be formed from include, laminated veneer lumber and panel products,

dimensional lumber, oriented strand board, oriented strand lumber, wood plastic composite, or any other engineered wood product known in the industry.

The overall form of the blank 20 is also variable. For example, the blank 20 may be a standard dimensional wood member having a rectangular or square in cross-section, such as illustrated in FIGURES 1-4. Additionally, or alternatively, the overall form of the blank may be different. For example, the blank 20 may have an I-beam or T-beam cross sectional shape, as illustrated in FIGURES 5-8. Consequently, the present invention is not intended to be limited by the overall form of the blank 20.

The present invention is also not limited by choice of material or combination of material. The blank 20 may contain substantially homogeneous material, such as a laminated strand lumber beam or board. Additionally, the blank 20 may contain non-homogeneous material. Non-homogeneous material is intended to mean a blank formed of various wood containing products, such as, without limitation, an I-beam having an oriented strand board web with laminated strand lumber flanges 34. Further, the overall dimensions of the blank 20 are not intended to limit the scope of this invention in any manner. Those skilled in the art will appreciate that a blank 20 of any common or any custom dimension is within the scope of this invention.

With further reference to FIGURES 1-13, the method of forming the castellated beam 21 is depicted. It will be appreciated, the present invention is applicable to both batch and continuous process formation. Initially the wood containing blank 20 is provided. The blank 20 includes a longitudinal axis 23. The longitudinal axis 23 is defined as the major axis of the blank 20, or that axis that is typically defined as parallel to the machine direction when formed in a continuous operation. Both continuous and batch blank 20 formation processes are well know in the art and therefore a detailed discussion is not necessary for the understanding of the present invention.

The blank 20 is cut along a cut line pattern 26 to divide the blank 20 into a first beam section 22 and a second beam section 24. The cut line pattern 26 is selected to form various lands and grooves along the cut line pattern 26 upon each of the first beam section 22 and a second beam section 24. Specifically, after the blank 20 is cut, the first beam section 22 will have both first beam section lands 44 and first beam section grooves 42. Additionally, the second beam section 24 will have both second beam section lands 48 and second beam section grooves 46.

After, the separating the first beam section 22 and the second beam section 24, the beam sections are shifted relative to each other along the longitudinal axis 23 until the first beam section lands 44 align with the second beam section lands 48. Once the respective beam sections are aligned as described they may be connected to form the castellated beam 21. Those skilled in the art will appreciate that the respective beam section may be directly reattached to one another as illustrated in FIGURES 1-13, or

spacers 40 may be inserted between the respective beam section, with each beam section being attached with the spacer 40. The spacer 40 arrangement is discussed in more detail below. It will be appreciated that this process creates a castellated beam 21 of greater overall dimensions than the original blank 20.

The shape of the cut line pattern 26 is variable. For example, the cut line pattern 26 may be in the form of a continuous curve such as a sinusoidal pattern depicted in FIGURES 1-4. In this manner, the cut line pattern 26 may be configured to form ellipses, circles or the like. Additionally, the cut line pattern 26 may be selected to form any polygon, such as, without limitation, quadrilaterals, hexagons, and octagons. The specific shape of the cut line pattern 26 may be readily determined by those skilled in the art based upon such things as application of the castellated beam 21.

Along with defining a specific geometric shape, the cut line pattern 26 also creates a specific open section 28 when the castellated beam 21 is formed. Specifically, the depth and length of the cut line pattern 26 dictates the overall size of the open section 28. For purposes of this application "depth" is measured in a direction substantially perpendicular to the longitudinal axis 23 of the castellated beam 21. Further, "length" of the open section 28 is measured along a direction substantially parallel to the longitudinal axis 23 of the castellated beam 21. Within any castellated beam 21, the cut line pattern 26 may be controlled to form a uniform sized open section as depicted in FIGURES 1-8. Alternatively, the cut line pattern 26 may be controlled to form non-uniformed sized open sections 28 such as those depicted in FIGURES 9-14. Those skilled in the art will appreciate that many factors will determine the specific cut line pattern 26 used. As such, a detailed discussion of the nature of the cut line pattern is not required herein to understand the invention.

FIGURES 9-11 depict an embodiment of a tapered castellated beam 21 according to the invention, effected by making the cut line pattern 26 path that is symmetrical with respect to a line inclined to a centerline of the blank 20. After the cut have been completed one of the respective beam sections is turned end for end with respect to the other beam section, and is also moved longitudinally relative to the other half in order to juxtapose the respective land sections. The respective beam sections are then connected to produce the tapered castellated beam shown in FIGURES 9-11.

It will appreciated that other asymmetrical forms of beam may be manufactured, for example beams with openings that are symmetrical along a line that extends parallel to, but offset from, the centerline of the finished castellated beam. Similarly, as discussed above, it will be appreciated that the openings themselves need not be symmetrical and that large varieties of shaped can be produced by appropriate choice of cutting lines.

Any variety of known methods or combinations thereof may be used to connect the relative beam sections together. For example, the beams may be adhered together

with any variety of adhesives compounds used in the industry. Additionally, various mechanical fasteners such as nails, screws, bolts, or straps and ties. Further, the first beams section lands and the second beam section lands may be further manufactured to form common joints such as finger joints that work alone or in combination with adhesives and/or mechanical fasteners to hold the respective beam sections together. Still further, any combination of the above fastening examples is considered within the scope of this invention.

When desired, the depth of a castellated beam may be increased by the use of spacers 40 placed between the first beam section 22 and the second beam section 24. The spacers 40 may be formed from any suitable material, however, a spacer formed from a material that is the same or similar to the material of the castellated beam 21 is often preferable. Additionally, the spacers 40 are generally attached to the respective beam section in the same manner as the respective beam sections are connected with each other.

The overall size of the spacers 40 is variable, and is largely dependent upon application. Those skilled in the art will appreciate that a castellated beam 21 may use spacers 40 that are all the same size. Alternatively, if a tapered beam is desired, the castellated beam 21 may employ a variety of sized spacers 40 to achieve this end.

The invention thus provides a simple method of producing castellated wood containing beams having a variety of shapes and overall geometry.

While the preferred embodiment of the invention has been illustrated and described, as noted above, many changes can be made without departing from the spirit and scope of the invention. Accordingly, the scope of the invention is not limited by the disclosure of the preferred embodiment. Instead, the invention should be determined entirely by reference to the claims that follow.